

## **REUSABLE CONTAINER FOR CONTACT LENSES AND OTHER MATERIALS**

### **BACKGROUND OF THE INVENTION**

#### **1. Field of the Invention.**

**[0001]** The present invention relates, in general, to reusable containers for storing, transporting and dispensing materials such as medications and contact lenses. Two or more of the reusable containers may be attached to a base unit so that they can be transported and dispensed together as a set.

#### **2. Relevant Background.**

**[0002]** One conventional method for packaging contact lenses is to place them in glass vials. In glass vial packaging, the contact lenses are typically stored in 3 to 5 milliliters of a storage solution in a vial that is plugged with a silicone rubber stopper held firmly in place by a crimp capped aluminum safety seal. The aluminum caps are not easily removed, and are not designed for reuse. To reseal these vials, a new aluminum safety seal has to be crimped onto the vial using a special crimping tool.

**[0003]** There are a number of problems associated with storing and dispensing contact lenses in glass vials: Because the vials are not easy to reseal, they are not a practical container for contact lens wearers to store their contact lenses between uses. Thus, contact lens wearers have to purchase separate contact lens cases while throwing the glass vials away. Also, because the vials are typically made of glass, they are easily breakable during transport and the glass shards can present a safety hazard. Still another problem with the vials is that they typically weigh much more than the contact lenses themselves and the extra weight increases shipping costs.

**[0004]** Another conventional method for packaging contact lenses is to place them in blister packs. In blister packaging, the contact lenses are sealed with 1 to 2 milliliters of solution in plastic and/or foil packaging, which is torn open when the contact lens wearer is ready to wear the lens. Like glass vials, blister packs are not designed for reuse by the contact lens wearer, and are typically used to store disposable contact lenses. Thus, like for glass vials, separate contact lens cases have to be purchased by contact lens wearers for storing the lenses between uses.

**[0005]** Still another conventional method for packaging contact lenses is to place them in flat packs without any solution. The contact lenses are shipped in a dry non-hydrated state in the flat packs. The contact lens wearer tears open the flat pack to access the lens and the packs are not reused. Separate contact lens cases have to be purchased by the contact lens wearer for storing the lenses between uses.

**[0006]** The problems with conventional packaging for contact lenses also extend to other materials. For example, many types of medications are shipped from manufacturers in the same type of glass vials used for shipping contact lenses. Like the glass vials for contact lenses, the vials used for medications are not designed for reuse or refilling, and are simply thrown away once they are empty. Thus, there remains a need for packaging for materials like medications and contact lenses that is convenient to reuse.

## **SUMMARY OF THE INVENTION**

**[0007]** Briefly stated, one embodiment of the invention is a reusable container that includes a lid and a chamber adapted for leaktight coupling to the lid, where the chamber includes a base unit attachment to attach the chamber to a base unit, and where two or more of the reusable containers can be attached to the base unit.

**[0008]** Another embodiment of the invention is a reusable contact lens container that includes a lid and a chamber to hold the contact lens adapted for leaktight coupling to the lid, and a base unit attached to two or more of the containers, where each of the containers has an opening that is attached to one or more anchor tabs that are formed on the base unit to attach the container to the base unit.

**[0009]** Still another embodiment of the invention is a method of storing a material in a reusable container that includes the steps of placing said material into the reusable container and leaktightly sealing the container, sterilizing the container, and attaching the container to a base unit that holds two or more of the reusable containers, where the reusable container includes a lid and a chamber adapted for leaktight coupling to the lid, and where the chamber includes a base unit attachment to attach the chamber to the base unit.

**[0010]** Additional novel features shall be set forth in part in the description that follows, and in part will become apparent to those skilled in the art upon examination of the following specification or may be learned by the practice of the invention. The features and advantages of the invention may be realized and attained by means of the instrumentalities, combinations, and methods particularly pointed out in the appended claims.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0011]** Fig. 1 shows a reusable container in an open position according to an embodiment of the invention;

**[0012]** Fig. 2 shows a cross sectional view of a reusable container in an open position according to an embodiment of the invention;

**[0013]** Fig. 3 shows a reusable container in a closed position for storing contact lenses according to an embodiment of the invention;

**[0014]** Fig. 4 shows a reusable container for storing materials according to an embodiment of the invention;

**[0015]** Fig. 5 shows a reusable container attached to a base unit according to an embodiment of the invention;

**[0016]** Fig. 6 shows six reusable containers attached to a base unit according to an embodiment of the invention; and

**[0017]** Fig 7 shows a flowchart of method of storing material in a reusable container according to an embodiment of the present invention.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

**[0018]** Referring now to Fig. 1, a reusable container 100 in an open position according to an embodiment of the invention is shown. In this embodiment, lid 102 and chamber 104 of container 100 are flexibly attached to each other by flexible member 106. Flexible member 106 allows easy coupling and decoupling of lid 102 and chamber 104 while insuring these parts stay in close proximity to each other.

**[0019]** Lid 102 includes lid surface 108 which may be opaque, or transparent. When lid surface 108 is transparent it acts as a window that allows one to view the contents of container 100 when lid 102 is coupled to chamber 102 (*i.e.*, when container 100 is closed). When lid surface 108 is a window, it may be shaped to act as a magnifying lens to magnify the contents of container 100. Lid surface 108 may also include an area that is easily penetrable by a syringe needle that can extract materials held by chamber 104.

**[0020]** Lid 102 may also include a seal 110 that provides a leak tight seal when coupled to flange face 122 and/or flange sidewall 124. Seal 110 may include a first surface that sealingly engages flange face 122 and/or a second surface that sealingly engages flange sidewall 124. Seal 110 may also extend over the

surface of lid 102 to form a membrane (not shown) for needle insertion into chamber 104.

**[0021]** A leak tight seal is formed when the first surface of seal 110 is compressed against flange face 122 and the second surface is compressed against flange sidewall 124. Sealing pressure between seal 110 and flange face 122 and flange sidewall 124 may be maintained by locking container 100 in a closed position with lid lock member 118. Seal 110 may be constructed of, among other materials, rubber materials such as a non-hydroscopic, low-impurity thermoplastic vulcanizate (TPV).

**[0022]** Lid 102 may also include tear strip 112 that makes container 100 tamper evident after being closed. In this embodiment, tear strip 112 is attached to lid 102 such that it may be irreversibly torn from lid 102 by pulling on pull tab 114. Once a portion of tear strip 112 is torn from lid 102, it cannot be reattached.

**[0023]** Tear strip 112 includes strip openings 116 through which strip lock tabs 117 are inserted when container 100 is first closed. After strip lock tabs 117 are inserted through strip openings 116, container 100 cannot be opened without tearing at least a portion of tear strip 112 away from lid 102, providing conspicuous evidence of tampering.

**[0024]** Alternatively, tear strip 112 may be replaced by a permanent seal that keeps lid 102 coupled to chamber 104. In this example, lid surface 108 may include an area that is easily penetrable by a syringe needle that can extract materials held by chamber 104.

**[0025]** Chamber 104 may include cavity 120 for holding a material in container 100. In this embodiment, cavity 120 has a concave hemispherical shape, and other shapes may be used as well, such as a convex hemisphere. Alternatively, chamber 104 may be open ended such that no closed cavity is formed. In this embodiment, container 100 acts as a cap and open chamber 104 can be coupled to a separate container (not shown) to form a closed cavity

inside the container. The closed cavity may hold a variety of materials such as food (e.g., ketchup), or medicine (e.g., aspirin).

**[0026]** Chamber 104 also includes base collar 126 in which opening 128, a base unit attachment, is formed. Opening 128 couples container 100 to a base unit (not shown) by inserting a portion of a base unit anchor tab through opening 128.

**[0027]** One or more openings like opening 128 may be formed in collar 126 to attach container 100 to a base unit. For example, two openings like opening 128 may be positioned 180° apart around collar 126 to match two base anchor tabs on the base unit that align with the openings. In another example, 4 openings positioned 90° apart may be formed in collar 126.

**[0028]** Fig. 2 shows a cross-sectional view of a reusable container according an embodiment of the invention like the one shown in Fig. 1. Container 200 includes seal 210 that is attached to two adjacent sides of lid 202. In this embodiment, when lid 202 is coupled to chamber 204 a first surface 211 of seal 210 sealingly engages flange face 222, and a second surface 213 of seal 210 sealingly engages flange sidewall 224. When the first and second surfaces 211 and 213 engage flange face 222 and flange sidewall 224 with sufficient pressure, container 200 is leaktightly sealed.

**[0029]** Leak tight pressure between seal 210 and the flange of chamber 204 may be maintained by locking lid 202 and chamber 204 together. In one embodiment the locking mechanism includes lid lock member 218 that engages lock tab 219 on chamber 204. Lock tab 221 may be attached to lid lock 218 to provide tamper evident protection to container 200. Lock tab 221 is irreversibly torn away from lid lock member 219 before lid lock member 219 is disengaged from lock tab 219 providing evidence that container 200 has been opened after lock tab 221 was first set. In another example, lock tab 221 may act as a second lid lock after the tear strip is removed.

**[0030]** Fig. 3 shows a reusable container according to an embodiment of the invention like the one shown in Figs. 1 and 2, but now in a closed position. The reusable container 300 includes lid 302 and chamber 304 attached to each other by flexible member 306. Tear strip 312 is shown in a sealed position where strip lock tabs 317 are at least partially inserted through strip openings 316, and tear strip 312 covers lid locking member 318.

**[0031]** Before opening container 300, tear strip 312 is removed from lid 302 by pulling on pull tab 314 and irreversibly separating tear strip 312 from lid 302. Attempts to open container 300 while tear strip 312 is still attached to lid 302 results in at least a portion of the tear strip 312 irreversibly separating from lid 302 and/or breaking a part of tear strip 312 itself, providing evidence of tampering.

**[0032]** Fig. 4 shows reusable container 400 having elongated chamber 404 according to another embodiment of the invention. In this embodiment, chamber 404 attaches to collar 426 by inserting at least a portion of chamber tab 430 through opening 428. When chamber tab 430 engages opening 428, a leak tight seal may be formed between chamber 404 and lid 402. When container 400 is closed, lid 402 is sealingly coupled to chamber 404 to form the leak tight seal.

**[0033]** In another embodiment, lid 402 and chamber 404 form an integral unit and collar 426 with opening 428 extends from the bottom of chamber 404. In this embodiment, container 400 may be attached to a base unit for transporting two or more containers 400 as a set.

**[0034]** Fig. 5 shows reusable container 501 attached to base unit 534, which is configured to hold up to two containers. The base unit 534 includes anchor tabs 530 that at least partially insert through openings 528 in collar 526 to attach container 501 to base unit 534. The container 501, may be reversibly or irreversibly attached to the base unit 534.

**[0035]** In another embodiment (not shown) anchor tabs 530 may be replaced with a threaded collar that forms part of the base unit and that can engage threads formed on collar 526. In this embodiment, container 501 may be reversibly attached to base unit 534 by being screwed onto base unit 534.

**[0036]** Fig. 6 shows a six-pack arrangement 600 of six reusable containers 601 attached to base unit 634 according to another embodiment of the invention. In this embodiment, containers 601 attached to base unit 634 with anchor tabs 630 at least partially inserted through openings 628.

**[0037]** The reusable containers of the present invention may be made from a wide variety of materials, including, without being limited to, plastic polypropylene. The materials may also include an anti-microbial additive or agent that kills microbes coming into contact with a surface of the reusable container. When the reusable containers are made of plastics, they may be produced by co-molding, shot molding, and/or injection molding, among other plastic molding techniques. In one embodiment, the process of making the reusable container may include using two-shot injection molding to integrally attach a seal with the lid of the container. Alternatively, the lid may be formed to accept a separate o-ring that is used to form a leaktight seal when the reusable container is closed.

**[0038]** The reusable containers of the present invention may be used as packaging to store and dispense materials such as contact lenses and medications. Fig. 7 shows flowchart steps for a method of storing materials in a reusable container according to a method of the present invention. In this embodiment of the method, the reusable container and material are obtained 602 and a decision 604 is made about whether the material can be sterilized in the containers.

**[0039]** A wide variety of materials may be stored, transported and dispensed in the reusable containers of the present invention, some of which should not undergo to a sterilization process. Examples of materials that may be stored by



the present invention include, without being limited to, contact lenses such as soft contact lenses, rigid contact lenses, and interocular lenses, medications such as vaccines and other medicines in a liquid state, cosmetics, soap, cleaners and solvents.

**[0040]** If the materials cannot be sterilized inside the container, then the empty container may be sterilized 606 before the material is added 608 to the container and the container is leaktightly sealed 610. Alternatively, if the decision 604 goes the other way and the materials can be sterilized in the container, then the materials are added 612 to the container, the container is leaktightly sealed 614, and then the container and materials are sterilized 616.

**[0041]** A variety of sterilization processes may be used with the present invention. Examples include, but are not limited to, steam sterilization, ethylene oxide sterilization, and irradiation sterilization (e.g., gamma irradiation), among other sterilization processes. The particular sterilization technique selected may depend on a number of variables, including the composition and size of the reusable container and the materials being stored inside the container, among other variables.

**[0042]** The sterilized and leaktightly sealed containers may be attached 618 to a base unit. Alternatively, the containers may be attached to the base unit before adding materials and/or sterilization. The containers attached to the base unit may be stored until ready for transport to a dispensing location or consumer (e.g., contact lens wearer).

**[0043]** Although the invention has been described and illustrated with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example, and that numerous changes in the combination and arrangement of parts can be resorted to by those skilled in the art without departing from the spirit and scope of the invention, as hereinafter claimed.

**[0044]** The words "comprise," "comprising," "include," "including," and "includes" when used in this specification and in the following claims are intended to specify the presence of stated features, integers, components, or steps, but they do not preclude the presence or addition of one or more other features, integers, components, steps, or groups.